

# THE SPECIES OF *Notiobia* PERTY (COLEOPTERA: CARABIDAE: HARPALINI) FROM BRAZIL

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**ABSTRACT** — The new species *Notiobia glabrata*, *N. maxima* and *N. pseudolimbipennis* are described. A key to the 11 *Notiobia* (*s.str.*) species known from Brazil, data about the distribution of each species and taxonomical remarks are provided. *Notiobia parilis* Bates, 1878 is a junior synonym of *N. nebrionides* Perty, 1830, and *Notiobia umbrata* Bates, 1882 is a junior synonym of *N. flavicinctus* Erichson, 1847. The Brazilian *Notiobia* species belong to at least three different species groups, each distributed from Brazil over the North-Western part of South America, Central America to Mexico.

**Key words:** Coleoptera, Carabidae, new species, Brazil.

**As Espécies de *Notiobia* Perty (Coleoptera: Carabidae: Harpalini) do Brasil.**

**RESUMO** — As novas espécies *Notiobia glabrata*, *N. maxima* e *N. pseudolimbipennis* são descritas. São fornecidos uma chave para as onze espécies de *Notiobia* (*s.str.*) conhecidas para o Brasil, dados sobre a distribuição e características taxonômicas de cada espécie. *Notiobia parilis* Bates, 1878 é uma sinonímia de *N. nebrionides* Perty, 1830, e *Notiobia umbrata* Bates, 1882 é uma sinonímia *N. flavicinctus* Erichson, 1847. As espécies de *Notiobia* do Brasil pertencem a pelo menos três diferentes grupos de espécies, cada um distribuído do Brasil para a parte Noroeste da América do Sul, e da América Central até o México.

**Palavras-chave:** Coleoptera, Carabidae, espécies novas, Brasil

## INTRODUCTION

The genus *Notiobia* Perty is part of the Anisodactylina, a subtribe of the large carabid tribe Harpalini. Noonan (1973) placed in *Notiobia* four groups previously regarded as separate genera: *Diatypus* Murray from the tropical region of Africa; *Diaphoromerus* Chaudoir from Australia, New Zealand, New Guinea, New Caledonia, the Moluccas, Timor, and Hawaii; *Anisotarsus* Chaudoir from North, Central, and temperate areas of South America; and *Notiobia* (*s.str.*) from Central America and tropical areas of South America.

The Neotropical species of the subgenus *Anisotarsus* were revised by Noonan (1981). Only two species are reported to occur in the dry areas of Brazil. The Mexican species of *Notiobia*

(*s.str.*) were already revised in Noonan's (1973) classification of Anisodactylina. Much less is known about the taxonomy and distribution of *Notiobia* (*s.str.*) in areas south of Mexico.

The idea to describe and key out the Brazilian species of *Notiobia* (*s.str.*) was born during an ecological study. Contrary to the rather strong taxonomical confusion of species in the mountain areas of Panama, Colombia, and Ecuador, the taxonomy of Brazilian species is quite clear. The present paper provides accurate taxonomic names for current ecological studies and provides information useful for future revision of all *Notiobia* species.

As far as known, *Notiobia* species live in forests. Adults of all species can fly. They are spermatophagous and their

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larvae seem to develop only on specific fruits. Therefore, fruit fall events in the forests which are restricted in time and space cause complicated ecological adaptations of *Notiobia* species (Paarmann, pers. comm.). The results on the phylogenetic and zoogeographic relations of these species will help to understand the process of the ecological adaptations.

## MATERIAL

Beside the vast material collected during an ecological research project by W. Paarmann, J. Adis and co-workers, and the author between 1992 and 1996, specimens of following institute collections were considered:

CAS - Dept. of Entomology, California Academy of Sciences (D. Kavanaugh, Berkeley, USA)

DEI - Deutsches Entomologisches Institut (L. Zerche, Eberswalde, Germany)

INPA - Instituto Nacional de Pesquisas da Amazônia (C.R.V. da Fonseca, Manaus, Brazil)

MPM - Milwaukee Public Museum (G.R. Noonan, Milwaukee, USA)

MZUSP - Museu de Zoologia da Universidade São Paulo (C. Costa, São Paulo, Brazil)

NMNH - National Museum of Natural History/Smithsonian Institute (M. Pogue & T.L. Erwin, Washington USA)

RSNB - Institut Royal des Sciences Naturelles de Belgique (J. Cools & K. Desender, Bruxelles, Belgium)

ZMB - Zoologisches Museum der Humboldt-Universität (F. Hieke, Berlin, Germany)

ZSS - Zoologische Staatssammlung (M. Baehr, Munich, Germany)

The terminology of the descriptions

and key follows Noonan (1981, 1991).

## DESCRIPTIONS

### Generic characters of *Notiobia* (*s.str.*)

Body length: 7-15 mm; body form slender to moderately stout.

Color: Dorsum testaceous, green, blue-green, cupreous or black with or without metallic lustre; ventral side generally dark piceous; legs, palps and antennomeres testaceous or piceous.

Head: Labrum straight to emarginate anteriorly; clypeus broadly emarginate; mentum with prominent median tooth, mentum and submentum completely separated by a transverse suture; paraglossa slightly longer than ligula. Frons usually with moderate to prominent fovea bearing a clypeo-ocular prolongation. Eyes mostly large and protruding; width of narrowest part of gena less than maximum width of antennomere I; supra-antennal ridges divergent anteriorly.

Thorax: Pronotum arcuate anteriorly, convergent posteriorly; posterior angles rounded or distinct, base lobed in most species; basal fovea more or less distinct; lateral bead complete, basal and anterior bead at least laterally distinct.

Legs: Anterior tibia with apical spur lanceolate; posterior femur usually with 2 long setae on posterior margin; posterior tarsus with segment I shorter than II+III; anterior and middle tarsi of males moderately to very strong enlarged.

Elytra: Interval III with a setigerous puncture in apical third; interval VII with a small setigerous puncture near apex and a slightly more proximal ocellate puncture. Hind wings

fully developed in most specimens.

Abdomen : Sternum VI of males with a pair of ambulatory setae. Median lobe of aedeagus symmetrical, without apical disc. Valvifer flat to slightly convex, lateral margin semi-membranous and without distinct boundary.

*Notiobia (s.str.) pseudolimbipennis*  
sp. n.

(Figs. 1, 4, 5, 6, 20)

Holotype: Male. Brazil, AM, Reserva Florestal A. Ducke, 35km NE Manaus. 31.08.93 leg. Paarmann et al. 55 paratypes (23 males, 32 females) from the same locality and collector. 6 males, 4 females 31.08.93, 3 males, 9 females 08.02.93, 2 males, 4 females 06.07.94, 5 males, 2 females 11.07.94, 1 female 7. and 11.08.95, 1 male, 1 female 22.08.95, 6 females 23.08.95, 1 female 16.09.95, 4 males, 4 females 29.10.95, 2 males 20.05.96.

Body length: 11-13 mm.

Color: Dorsum with labrum rufopiceous and clypeus yellow-piceous; remaining parts of head, pronotum, and elytra greenish, blue-green or cupreous with metallic lustre; ventral part of body generally dark piceous; legs rufopiceous to dark rufopiceous, palpi and antenna testaceous.

Head: Labrum straight anteriorly, clypeus broadly emarginate anteriorly; frons with foveae punctiform, bearing a distinct clypeo-ocular prolongation to eyes; eyes large and protruding. Microsculpture not distinct, micropunctures present.

Thorax: Pronotum with sides arcuate anteriorly, convergent and rectilinear posteriorly; posterior angles arcuate to

slightly obtuse, base lobed; lateral depression complete, widened posteriorly and ending in the wide, shallow basal fovea; lateral bead complete, basal and anterior beads only distinct at the sides, absent in the middle. Microsculpture of very fine transverse meshes, micropunctures present.

Legs: Dorsa of all tarsi glabrous except the anterior tarsi I-IV of males which bear single small hairs. Anterior and median tarsi of males strongly expanded laterally.

Elytra: Scutellar striae moderately long, posteriorly turning to stria I; intervals slightly convex, subapical sinuation distinct (Fig. 1); sutural angles broadly rounded. Elytral intervals with micropunctures, microsculpture of inner intervals fine transverse meshes, that of lateral 2-3 intervals strongly granulate.

Abdomen: Sternum VI of females evenly rounded apically (Fig. 4). Aedeagus with median lobe slender with pointed apex (Figs. 5, 6). Everted internal sac (Fig. 20) with a large field of macrotrichia on right side.

Distribution: The species is known from the type locality and from Panama, Cerro Campana.

Derivation of species name: The name expresses the similarity of the new species to *N. viridula* (= *N. limbipennis*).

Deposition of type material: The holotype and part of the paratypes are deposited at the Systematic Entomology collection of the INPA (Manaus, Brazil). The rest of the paratypes are at the Zoological Museum of the University São Paulo, in the collection W. Paarmann and the collection of the author.

Discussion: *N. pseudolimbipennis* is closely related to *N. viridula*, a widespread

species in Central and South America. However, *N. pseudolimbipennis* is clearly distinguished from *N. viridula* by the lack of the apical spine of sternum VI in females. Furthermore, the granulate lateral area of the elytra is green or green-bronze with a metallic lustre like the rest of the elytral intervals in the Brazilian specimens of *N. pseudolimbipennis*. It is distinctly lighter, yellow-testaceous in *N. viridula*.

*N. viridula* is not known from the Amazonian lowlands. Probably *N. pseudolimbipennis* replaces *N. viridula* in this region.

Specimens without an apical spine on sternum VI of females but with bicolored elytra were found in Panama (Cerro Campana, coll. NMNH). These specimens have a green-bronze dorsal surface, but the granulate area is not extended like in *N. viridula*. Therefore these Panamanian specimens belong to *N. pseudolimbipennis* but represent a transitional form which is similar to *N. viridula*.

### *Notiobia (s.str.) glabrata* sp.n.

(Figs. 2, 15, 16, 22, 23)

Holotype: Male. Brazil, AM, Reserva Florestal Ducke, 35km NE Manaus. 20.04.93 leg. Paarmann et al. 35 paratypes (21 males, 14 females) from the same locality and collector. 2 males, 2 females 20.04.93, 1 male, 1 female 09.06.92, 4 males, 2 females 14.02.93, 2 males, 1 male 26.05.94, 2 males, 2 females 20.06.94, 1 female 25.06.94, 1 male, 1 female 24.07.94, 1 male, 3 females 05.07.94, 2 males, 1 female 08.07.94, 1 male 29.10.95, 5 males 20.05.96.

Body length: 10-12 mm.

Color: Dorsum with labrum and clypeus piceous; remaining parts of head, pronotum, and elytra green or cupreous with metallic lustre; ventral part of body generally dark piceous; legs piceous, palpi and antenna yellow-piceous.

Head: Labrum straight to slightly emarginate anteriorly, clypeus broadly emarginate anteriorly; frons with foveae punctiform, bearing a distinct clypeo-ocular prolongation to eyes; eyes large and protruding. Microsculpture not distinct, micropunctures present.

Thorax: Pronotum (Fig. 23) with sides arcuate anteriorly, convergent and rectilinear posteriorly; posterior angles distinct, not rounded, slightly obtuse, base lobed; lateral depression complete; basal fovea shallow; basal and lateral beads complete; anterior bead distinct only at the sides, obsolete in the middle. Microsculpture not distinct, surface shining; micropunctures present.

Legs: Dorsa of anterior tarsi I-IV of males pubescent, rest of tarsi of males and tarsi of females glabrous dorsally; anterior and median tarsi of males comparably slightly extended.

Elytra: Scutellar striae moderately long and not reaching stria I; intervals slightly convex; subapical sinuation of elytra not distinct (Fig. 2); sutural angles broadly rounded. Microsculpture lacking even in lateral intervals, elytra shining; micropunctures present.

Abdomen: Sternum VI of females evenly rounded apically (cf. Fig. 4). Aedeagus with median lobe obtusely rounded apically (Figs. 15, 16). Everted internal sac (Fig. 22) dorso-basally with a field of 5-25 large spines. The spines are arranged more

or less in two rows.

Distribution: The species is known from the type locality and from Peru, prov. Loreto, Rio Napo, Rio Amazonas, prov. Madre de Dios, Pakitza, Guyana, and Bolivia, prov. La Paz (one specimen each in NMNH and MPM).

Derivation of species name: The name is related to the dorsal surface of the body which lacks a microsculpture.

Deposition of type material: The holotype and part of the paratypes are deposited at the Systematic Entomology collection of the INPA (Manaus, Brazil). The rest of the paratypes are at the Zoological Museum of the University São Paulo, in the collection W. Paarmann and the collection of the author.

Discussion: *N. glabrata* is morphologically a transitional form between *N. leiroides* and *N. maxima*. *N. glabrata* differs from *N. maxima* by the structure of the aedeagus and the generally smaller size. *N. glabrata* is distinguished from *N. leiroides* by the distinctly slender anterior tarsi of males and the absence of microsculpture. Moreover, the typical *N. leiroides* lacks a prolongation of the frontal foveae to the eyes. However there are known specimens of the *leiroides*-group from Peru with a clypeo-ocular prolongation of the frontal fovea and with flattened microsculpture, which are close to *N. glabrata*. Further studies are needed to decide if these specimens fall within the variation of *N. leiroides* or represent a separate species. A rather strong radiation of this groups occurs also in Panama. A revision of the Panamanian forms is needed.

### *Notiobia (s.str.) maxima* sp.n.

(Figs. 13, 14, 21)

Holotype: Male. Brazil, AM, Reserva Florestal A. Ducke, 35km NE Manaus. 17.08.92 leg. Paarmann *et al.* 20 paratypes (12 males, 8 females) from the same locality and collector. 1 female 17.08.92, 1 male 20.10.93, 15.11.93, 14.12.93, 26.05.94, 1 male, 2 females 20.06.94, 1 male, 2 females 22.06.94, 1 female 05.07.94, 11.07.94, 1 male 8.07.94, 24.07.94, 10.01.95, 1 female 20.12.95, 3 males 20.05.96.

Body length: 13-15 mm.

Color: Dorsum with labrum and clypeus piceous; remaining parts of head, pronotum, and elytra green, bronze or cupreous with metallic lustre; ventral part of body generally dark piceous; legs, palpi and antenna piceous.

Head: Labrum slightly emarginate anteriorly, clypeus broadly emarginate anteriorly; frons with foveae punctiform, bearing a distinct clypeo-ocular prolongation to eyes; eyes large and protruding. Microsculpture not distinct, micropunctures present.

Thorax: Pronotum (Fig. 23) with sides arcuate anteriorly, convergent and rectilinear posteriorly; posterior angles arcuate to slightly obtuse, base lobed; lateral depression complete, ending in shallow basal fovea; basal and lateral beads complete; anterior bead distinct only at sides, obsolete in middle. Microsculpture not distinct, surface shining; micropunctures present.

Legs: Dorsa of anterior tarsi I-IV in males with single fine hairs, rest of tarsi in males and tarsi in females gla-

brous dorsally; anterior and median tarsi of males usually expanded laterally.

Elytra: Scutellar stria moderately long and nearly reaching stria I; intervals slightly convex; subapical sinuations of elytra not distinct (Fig. 2); sutural angles broadly rounded. Microsculpture lacking even on lateral intervals, elytra shining; micropunctures present.

Abdomen: Sternum VI of females evenly rounded apically (Fig. 4). Aedeagus with median lobe obtusely rounded apically (Figs. 13, 14). Everted internal sac (Fig. 21) with irregularly distributed large spines.

Distribution: The species is only known from the type locality.

Derivation of species name: The name refers to the body size, it is the largest known species of *Notiobia* (*s.str.*).

Deposition of type material: The holotype and part of the paratypes are deposited at the Systematic Entomology collection of the INPA (Manaus, Brazil). The rest of the paratypes are at the Zoological Museum of the University São Paulo, in the collection W. Paarmann and the collection of the author.

#### Checklist of *Notiobia* (*s. str.*) Perty

(Underlined species are known from Brazil.)

*aulica* (Dejean, 1829: 295) (Distribution: Brazil, states Rio Grande do Sul, São Paulo, Santa Catarina, Rio de Janeiro, Parana, Espirito Santo, Goiás, Mato Grosso do Sul, Pará, Amazonas; Paraguay, Asunción; Argentina, provs. La Rioja, Salta; Colombia; Ecuador, Baños; Bolivia, depts. Cochabamba, Carrasco; Peru, depts. Madre de Dios,

Pakitzá; Venezuela, states Merida, Aragua. Remarks: Described as *Harpalus aulicus*. Separation from *wilkensi* Chaudoir difficult, especially in females.)

*chiriquensis* Bates, 1884: 270 (Distribution: Panama, Volcano de Chiriqui; Bolivia, Yungas, Incachaca 2100m, Cochabamba. Remarks: Synonym *concolor* Bates nec Putzeys.)

*concolor* Putzeys, 1878: 72 (Distribution: Colombia, divs. Cundinamarca, Caldas, Norte de Santander.)

*cooperi* Noonan, 1973: 325 (Distribution: Mexico, states Nayarit, Tepic.)

*cupreola* Bates, 1878: 590 (Distribution: Costa Rica, Irazu.)

*disparilis* Bates, 1878: 589 (Distribution: Brazil, states São Paulo, Amazonas; Bolivia, dept. Cochabamba; Peru, depts. Loreto, Madre de Dios; Suriname, Marowijne distr.; French Guiana, Rio Lawá; Nicaragua; Panama, Canal Zone, Barro Colorado Isl.)

*ewarti* Noonan, 1973: 325 (Distribution: Mexico, states Veracruz, Chiapas.)

*flavinctus* Erichson, 1847: 70 (Distribution: Brazil, states São Paulo, Amazonas; Bolivia, dept. Cochabamba; Peru, depts. Madre de Dios, Loreto; Guatemala; Panama, Canal Zone, Barro Colorado Isl.; southern Mexico. Remarks: Described as *Anisotarsus flavinctus*; synonym: *umbrata* Bates, 1882. The type series of *N. flavinctus* in the ZMB collection is conspecific with the species described by Bates. The range of variation in this widespread species is comparatively low.)

*glabrata* Arndt, sp. n. (Distribution: Brazil, state Amazonas; Peru,



depts. Loreto, Madre des Dios; Bolivia, dept. La Paz; Guyana.)

*incerta* Bates, 1882: 53 (Distribution: Nicaragua. Remarks: *N. incerta* is probably a synonym of *N. umbrifera* Bates (G. Noonan, pers. comm.; G. Noonan compared both types in the collection of the British Natural History Museum.)

*jucunda* Putzeys, 1878:71 (Distribution: Brazil, state Bahia; Venezuela, state Zulia; Colombia, div. Cundinamarca; Ecuador, prov. Tungurahua. Remarks: A single specimen is probably known from Brazil. It is deposited in the collection of ZMB and labeled "Bahia" which means probably the Brazilian state).

*leiroides* Bates, 1878: 590 (Distribution: Panama, Cerro Campana, Canal Zone, Barro Colorado Isl.; El Salvador, Depto. La Libertad; Nicaragua; Guatemala; British Honduras; Mexico; Texas)

*longipennis* Putzeys, 1878: 73 (Distribution: Colombia, between Tapias and Las Cruces.)

*maxima* Arndt, sp. n. (Distribution: Brazil, state Amazonas.)

*melaena* Bates, 1882: 54 (Distribution: Guatemala; Mexico.)

*nebrionides* Perty, 1830: 13 (Distribution: Brazil, states São Paulo, Amazonas, Goiás; Bolivia, depts. Cochabamba, Santa Cruz, Pando; Peru, depts. Junin, Madre de Dios, Loreto; Ecuador, Esmeraldas; Trinidad; Panama, Canal Zone, Barro Colorado Isl.; Costa Rica, Turrialba, Reventazón riv.; southern Mexico. Remarks: Synonyms: *brasiliensis* Chaudoir 1835, *parilis* Bates, 1878. *N.*

*nebrionides* was described based on a single specimen from "Brasilia australis". The holotype is deposited in the collection of ZSS. This specimen falls within the variation range of the variable species *N. parilis* Bates, 1878. Therefore, *N. parilis* Bates is a junior synonym of *N. nebrionides*. For further remarks see *N. parilis* in Noonan 1973.)

*obscura* Bates, 1882: 53 (Distribution: Southern Mexico. Remarks: Synonym *virens* Bates 1882, Noonan 1973.)

*pallipes* Bates, 1882: 53 (Distribution: Trinidad; Panama; Guatemala; Costa Rica; southern Mexico. Remarks: Probably conspecific with *aulica* Dejean; synonym: *subaurata* Bates 1882, Noonan 1973.)

*pseudolimbiennis* Arndt, sp. n. (Distribution: Brazil, state Amazonas; Panama, Cerro Campana.)

*ruficruris* (Brullé, 1838: 35) (Distribution: Bolivia.)

*similis* Putzeys, 1878: 72 (Distribution: Colombia, Ubáque, Manizales.)

*umbrifera* Bates, 1884: 271 (Distribution: Brazil, states São Paulo, Rio de Janeiro, Goiás, Rio Grande do Sul, Amazonas, "Upper Amazonas"; Peru, depts. Loreto, Madre des Dios; Panama, Canal Zone, Barro Colorado Isl.)

*viridula* (Dejean, 1829: 297) (Distribution: Brazil, states Santa Catarina, Paraná, Curitiba, Rio de Janeiro; Peru, depts. Loreto, Madre de Dios; Bolivia, dept. Cochabamba; Trinidad; Tobago; French Guiana, St. Laurent du Maroni; Costa Rica, Turrialba, Reventazón riv.; Panama, Canal Zone, Barro Colorado Isl. El Salvador, San Salvador; Nicaragua; Guatemala, dept. Zacapa; Mexico.

Remarks: Described as *Harpalus viridulus*; synonyms: *limbipennis* Bates, 1878; *sinuessa* Bates, 1882; *viridella* Csiki. *N. limbipennis* is a junior synonym of *N. viridula*. G. Noonan (pers. comm.) who examined the holotype in the Museum National d'Histoire Naturelle Paris, confirmed van Emden's determination of this species in several museum collections.)

*wilkensi* (Chaudoir, 1837: 47) (Distribution: Brazil, states Espirito Santo, Santa Catarina; Paraguay, Alto Parana; Argentina, Rio Salado. Remarks: Described as *Harpalus wilkensi*.)

Three undescribed species are not included in the list: two species similar to *N. nebrioides* (from Bolivia, dept. Cochabamba; Peru, depts. Madre de Dios, Loreto), and one species similar to *N. jucunda* (from Bolivia, Cochabamba and Argentina, Salta-distr.).

The taxonomy of the *jucunda/chiriquensis*-group from Panama, Chiriqui needs a revision.

### Junior synonyms

*aequata* Bates, 1882: 54 (synonym of *melaena* Bates).

*brasiliensis* Chaudoir, 1835: 431 (synonym of *nebrioides* Perty).

*championi* Bates, 1882: 54 (synonym of *jucunda* Putzeys).

*concolor* Bates, 1882: 53 non Putzeys (synonym of *chiriquensis* Bates).

*limbipennis* Bates, 1878: 590 (synonym of *viridula* (Dejean)).

*parilis* Bates, 1878: 590 (synonym of *nebrioides* Perty).

*sinuessa* Bates, 1882: 56 (synonym of *limbipennis* Bates).

*subaurata* Bates 1882: 53 (syn-

onym of *pallipes* Bates).

*umbrata* Bates, 1882: 55 (synonym of *flavicinctus* Erichson).

*virens* Bates 1882: 53 (synonym of *obscura* Bates).

*viridella* Csiki, 1929: 1047 (synonym of *viridula* (Dejean)).

### Transferred species

*Notiobia praeclara* Putzeys, 1878 was transferred to *Anisotarsus* Chaudoir by Noonan (1981).

*Notiobia transversicollis* Putzeys, 1878 and *columbiana* Reiche, 1843 are members of the subtribe Pelmatellina (confirmed by G. Noonan, pers. comm.). *N. colombiana* was described as *Acupalpus* and transferred to *Notiobia* by Putzeys (1878). According to the description, *N. aeneola* Putzeys, 1878 and *dubia* Putzeys, 1878 are also Pelmatellina, however, the types were not available.

### DISCUSSION

The 11 species known from Brazil can be tentatively placed in 3 species groups.

The first group is characterized by granulate lateral areas of the elytra, which are in part light yellow-testaceous. This character is absent in *Anisotarsus* and related genera and can be considered as apomorphic. The group includes the species *Notiobia disparilis*, *N. nebrioides*, *N. pseudolimbipennis*, *N. viridula*, and probably *N. flavicinctus*. All these species occur on fallen fruits of *Ficus*. The larval development of *N. pseudolimbipennis* and *N. flavicinctus* was also observed on fallen fruits of *Ficus*. However, the *N. nebrioides* population of Manaus (Brazil) was found



to develop on fallen fruits of *Vismia* and *Coussapoa* (Paarmann, pers. comm.), and one of the populations in Loreto Boca (Peru) was collected on fallen fruits of *Cecropia* (specimens in NMNH). *N. nebrionides* is the species with the weakest development of the granulate microsculpture.

The second group has flat elytral intervals, the microsculpture is uniform or absent. These characters are probably plesiomorphic (see also Noonan 1973). The phylogenetic relationship of the species is therefore not evident. The group includes *N. aulica*, *N. glabrata*, *N. jucunda*, *N. maxima*, and *N. wilkensi*. The larval development of these species was observed on fallen fruits of Melastomataceae or (in Peru) *Cecropia*. The adults also appear on fallen fruits of *Ficus*, where they only eat but do not reproduce (Paarmann, pers. comm.).

The third group comprises only *N. umbrifera*, which cannot be placed in one of the previous groups. This species has a spatula-shaped prolongation of the median lobe of the aedeagus, which is doubtless an apomorphic character state. Adults of *N. umbrifera* were frequently found on *Ficus*, *Cecropia* and on *Miconia* fruit fall. The larval development was only observed on *Miconia* fruit fall (Paarmann, pers. comm.).

All three species groups are widespread and occur in the whole area of *Notiobia* (*s.str.*) from Brazil to Mexico.

## KEYS TO THE SUBGENERA AND SPECIES

### Key to the subgenera *Notiobia* (*s.str.*) Perty and *Anisotarsus*

### Chaudoir (after Noonan 1973).

1 Gena narrow, narrower than maximum width of antennomere I or frontal fovea with clypeo-ocular prolongation; eyes mostly strongly protruding. 2

- Gena wide, wider than maximum width of antennomere I; eyes not protruding. *Anisotarsus*

2(1) Frontal fovea with clypeo-ocular prolongation. *Notiobia* (*s.str.*)

- Frontal fovea without clypeo-ocular prolongation. 3

3(4) Frontal fovea of head large, prominent; supra-antennal ridges strongly divergent anteriorly from eyes; eyes large and protruding. *Notiobia* (*s.str.*)

- Frontal fovea of head small, supra-antennal ridges various, size of eyes various. *Anisotarsus*

### Key to the *Notiobia* (*s.str.*) species from Brazil

1 Postero-lateral intervals of elytra with a region of distinct granulate microsculpture, extended in some females to widest part of the elytra and/or light yellowish; subapical sinuation of elytra prominent (Fig. 1) or not (Fig. 2). ..... 2

- Lateral intervals of elytra without granulate microsculpture; microsculpture of all intervals uniform or lacking; lateral parts of elytra not yellowish and not lighter than the green colored inner intervals; subapical sinuation of elytra not prominent (Fig. 2). ..... 7

2(1) Subapical sinuation of elytra prominent (Fig. 1). ..... 3

- Subapical sinuation of elytra not prominent (Fig. 2). ..... 5

3(2) Intervals of elytra the same in males and females, not convex;

median lobe of aedeagus various; dorsum green, bronze or blue-green, lateral intervals in part pale yellow-testaceous. .... 4

- Males with intervals of elytra convex, dorsum of males bicolored in most specimens, head and pronotum golden green-cupreous, elytra black with purple tinge; median lobe of aedeagus with short but wide apex (Fig. 7). Females with convex intervals 2, 4 and 6, but flat intervals 1, 3, 5, and 7; dorsum of females uniformly dark colored. .... *N. disparilis* Bates

4(3) Sternum VI of females produced into a ventrally projected spine (Fig. 3); median lobe of male aedeagus with short but wide apex (Fig. 12); elytra distinctly bicolored, with lateral intervals granulate, pale yellow-testaceous and inner intervals green-cupreous; in females granulated area in the anterior part enlarged, covering the full anterior part of elytra. .... *N. viridula* (Dejean)

- Sternum VI of females rounded apically (Fig. 4); median lobe of male aedeagus with longer and more narrow apex (Figs. 5, 6); elytra not distinctly bicolored in most specimens; granulated area of elytra anteriorly not expanded to the middle part, dorsal surface more shining, green, cupreous or black with greenish, bluish or purple lustre.....  
..... *N. pseudolimbipennis* sp. n.

5(2) Body length 11-13 mm; lateral intervals of elytra of the same color as inner intervals, not pale yellow-testaceous; median lobe of aedeagus pointed (Fig. 8)..  
..... *N. nebrionides* Perty

- Body length 7-10 mm; lateral intervals, in some females whole elytra except a preapical macula, granulated and pale yellow-testaceous,

inner intervals green or cupreous; aedeagus not as in Fig. 8. .... 6

6 (5) Pale region of lateral intervals in both sexes narrow, sometimes indistinct; body length usually 7-8 mm; apex of median lobe of aedeagus elongated, spatula-shaped (Fig. 9, 10), anterior tarsi of males much narrower than in the following species. ....

..... *N. umbrifera* Bates

- Pale region of lateral intervals strongly enlarged in females, in specimens from the Andes and Central America covering the whole elytra except a subapical region, in Amazonian specimens extended to the lateral 4-5 intervals in the posterior part of elytra; median lobe of aedeagus very slender, with nearly rounded apex (Fig. 11); anterior tarsi of males very wide.

..... *N. flavicinctus* (Erichson)

7 (1) Elytra very smooth and shining, microsculpture even in the outer intervals indistinct, intervals not completely flattened; posterior angles of pronotum not rounded, subdentate (Fig. 23). .... 8

- All intervals of elytra with equal and distinct microsculpture, elytra dull, intervals very flat, separate from each other only by a faint row of punctures; posterior angles of pronotum rounded (Figs. 24, 25). .... 9

8 (7) Body length 13-15 mm; median lobe of aedeagus wide and stout (Figs. 13, 14). .... *N. maxima* sp. n.

- Body length 10-12 mm; median lobe of aedeagus compareably slender (Figs. 15, 16). .... *N. glabrata* sp. n.

9 (7) Posterior angles of pronotum rounded (Fig. 25); body parallel sided, body length 11-12.5 mm; median lobe of aedeagus wide (Fig. 19). ....

..... *N. jucunda* Putzeys

- Posterior angles of pronotum more distinct (Fig. 24); body shorter and stout, length 8-10 mm. .... 10  
 10 (9) Median lobe of aedeagus slender with apex pointed (Fig. 17). ....  
 ..... *N. aulica* (Dejean)  
 - Median lobe of aedeagus very narrow with apex elongated but not pointed (Fig. 18). ..... *N. wilkensi* (Chaudoir)

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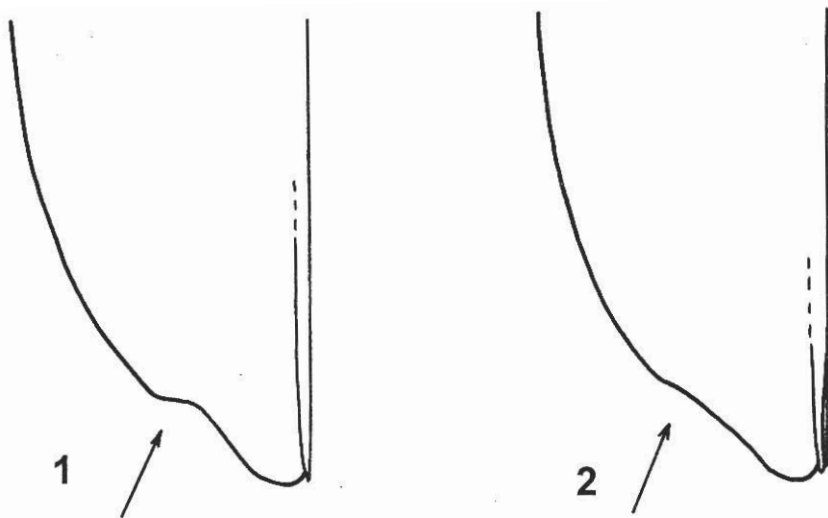
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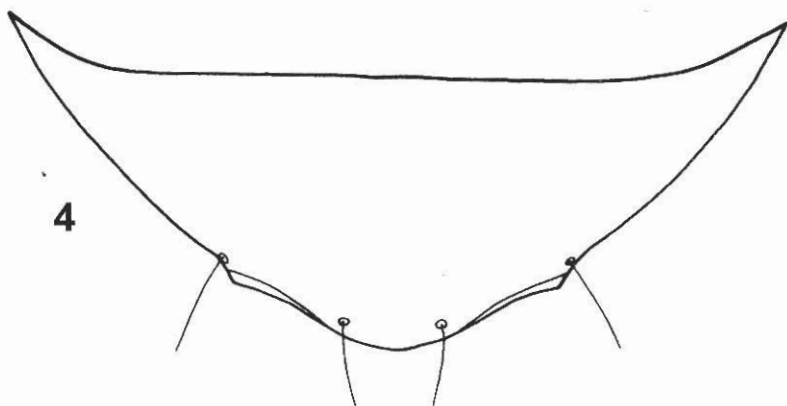
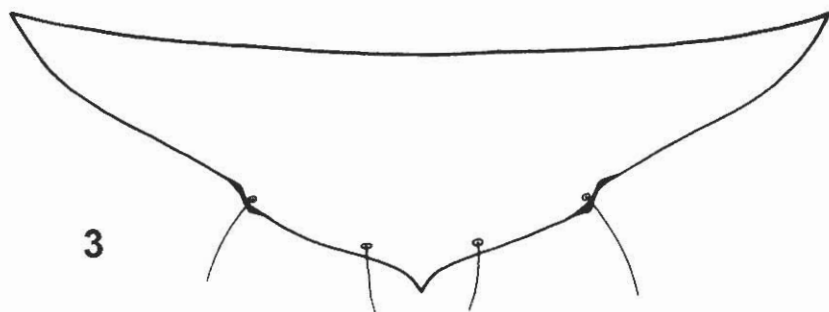
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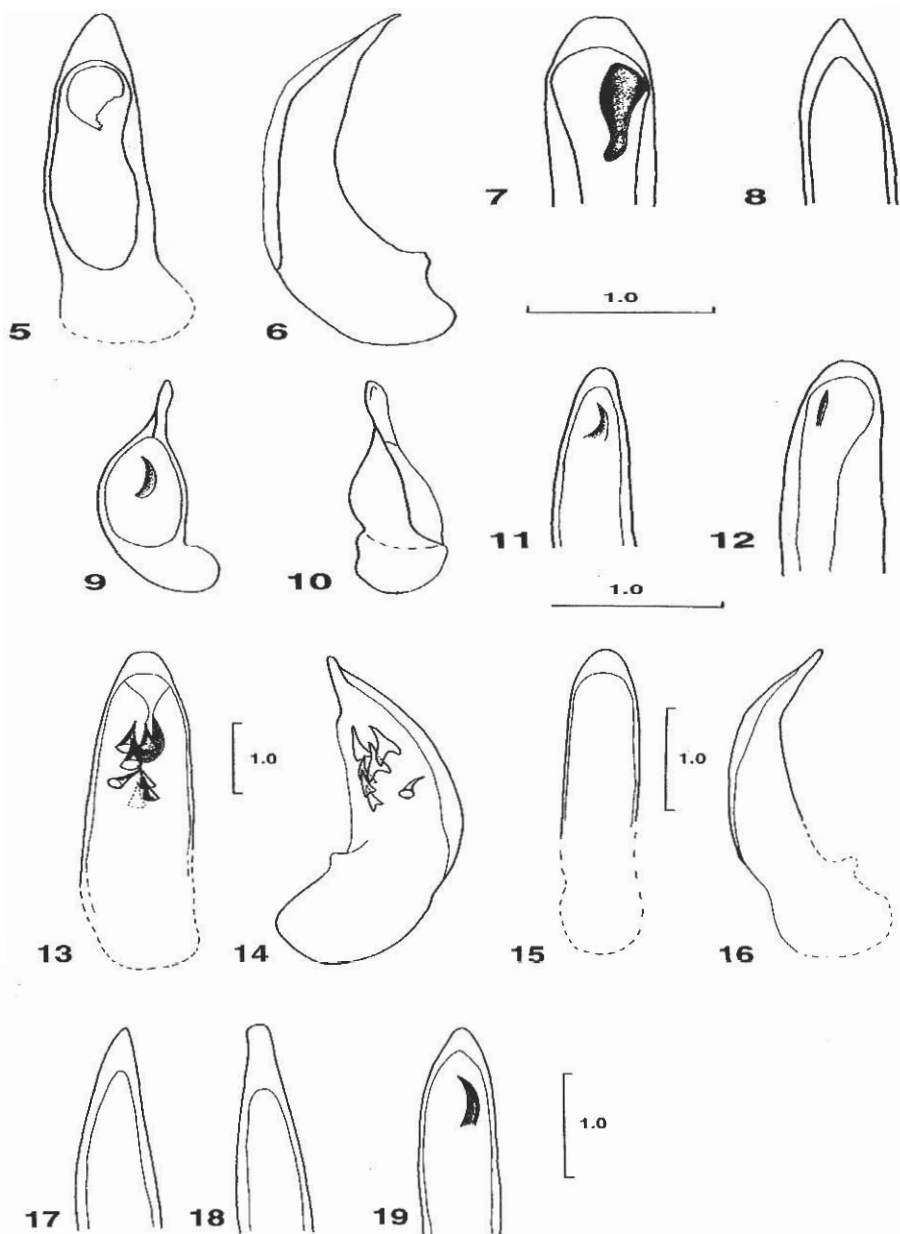
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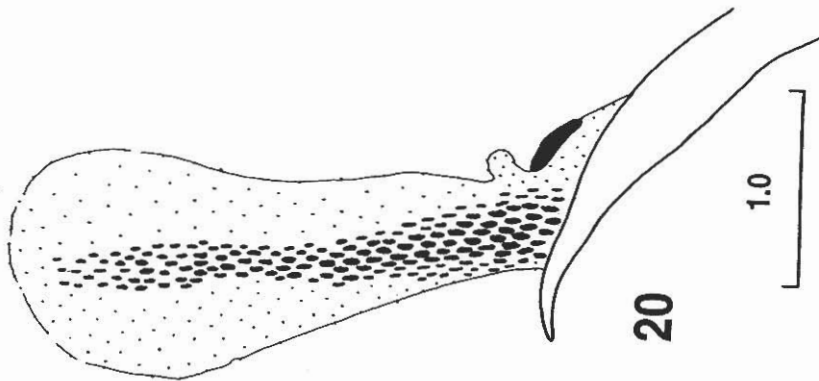
Figures 1-2. Subapical situation of elytra. Fig. 1. *N. pseudolimbipennis*. Fig. 2. *N. glabrata*.



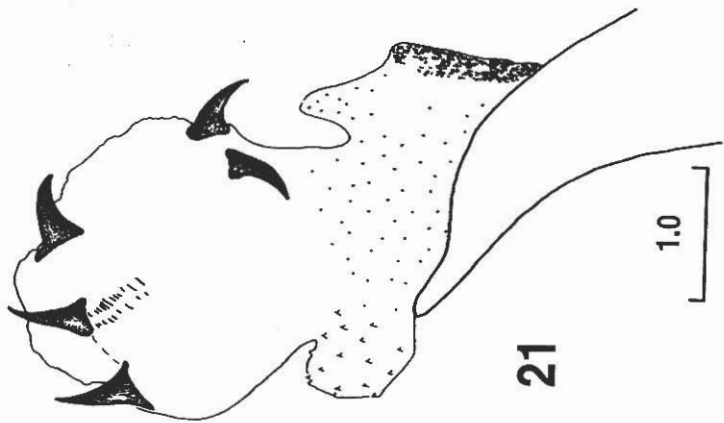
Figures 3-4. Sternite VI of female. Fig. 3. *N. viridula*. Fig. 4. *N. pseudolimbipennis*.



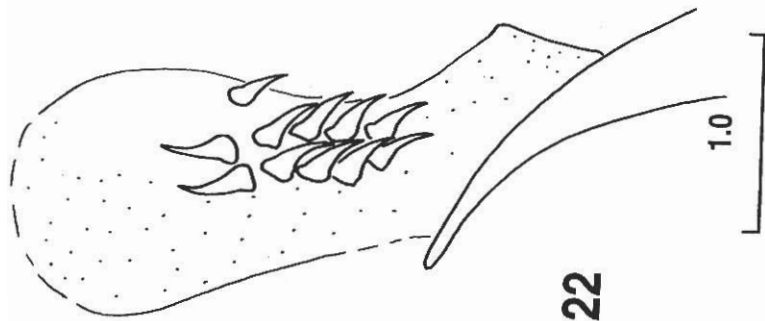
**Figures 5-19.** Median lobe of aedeagus. Figs. 5, 6. *N. pseudolimbipennis*, dorsal and lateral aspect, Fig. 7. *N. disparilis* dorsal aspect, Fig. 8. *N. nebrioides*, dorsal aspect, Figs. 9, 10. *N. umbrifera*, dorsal and lateral aspect, Fig. 11. *N. flavicinctus*, dorsal aspect, Fig. 12. *N. viridula*, dorsal aspect, Figs. 13, 14. *N. maxima*, dorsal and lateral aspect, Figs. 15, 16. *N. glabrata*, dorsal and lateral aspect, Fig. 17. *N. aulica*, dorsal aspect, Fig. 18. *N. wilkensi*, dorsal aspect, Fig. 19. *N. jucunda*, dorsal aspect (scales 1 mm, only Figs. 13, 14 smaller scale).



20



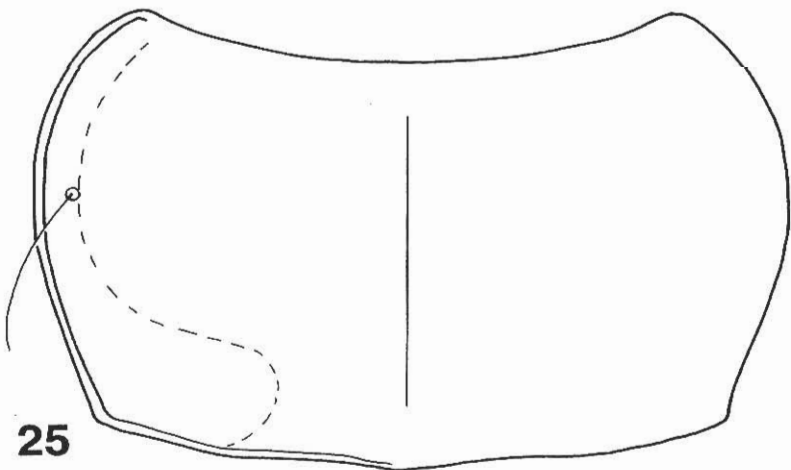
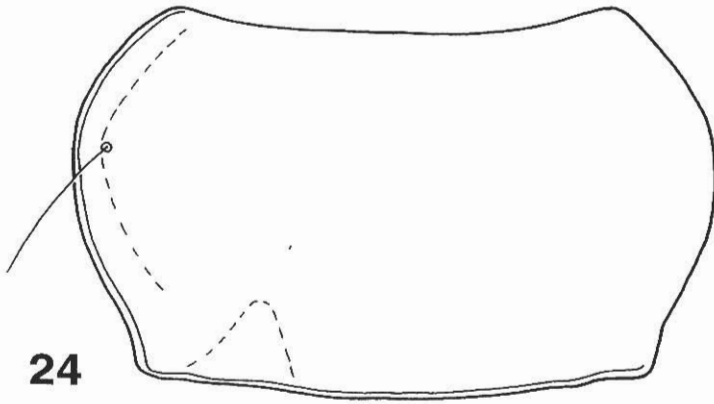
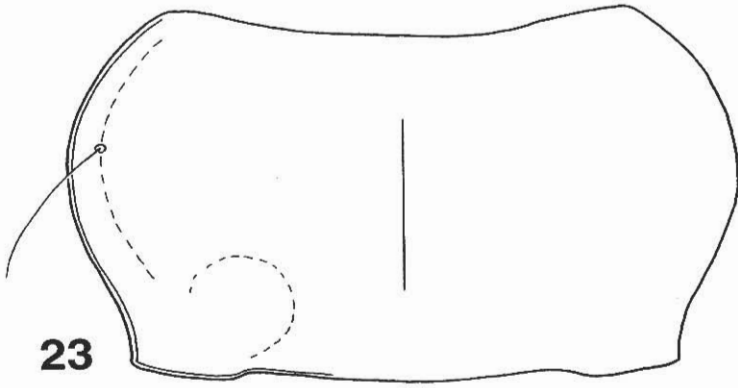
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22

Figures 20-22. Everted internal sac of male genitalia. Fig. 20. *N. pseudolimbipennis*, Fig. 21. *N. maxima*, Fig. 22. *N. glabrata* (scales 1 mm).





Figures. 23-25. Pronotum. Fig. 23. *N. glabrata*, Fig. 24. *N. aulica*, Fig. 25. *N. jucunda* (scale 1 mm).